3 1

~~69~~. The composition of matter of claim ~~67~~ in which said plurality of sub-populations is comprised of one of said sub-populations for each charge state number whose minimum value is not less than seven and whose maximum value is not less than ten.

4 1

~~70~~. The composition of matter of claim ~~67~~ in which said populations of multiply charged ions is formed by:

dispersing a solution containing said polyatomic parent molecular species into a bath gas as charged droplets, said dispersing taking place in the presence of an electric field; and

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said distinct polyatomic parent molecular species becomes dispersed in said bath gas as said multiply charged ions.

5 1

~~71~~. The composition of matter of claim ~~67~~ in which said single polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

6 1

~~72~~. The composition of matter of claim ~~67~~ in which said single polyatomic parent molecular species is not selected from the group comprising synthetic polymers comprising less than four distinct elements, said group comprising polyethylene glycols.

7 1

~~73~~. The composition of matter of claim ~~67~~ in which a mass spectrum is generated from said population of multiply charged ions, said mass spectrum comprising a sequence of peaks due to said plurality of sub-populations of said population of multiply charged ions and analyzing said peaks of said mass spectrum to determine a value of said molecular weight of said single polyatomic parent molecular species.

8 1

~~74~~. The composition of matter as claimed in claim ~~67~~ in which said single polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

9

~~75~~. A composition of matter comprising a population of multiply charged ions derived from a sample substantially comprising a single polyatomic parent molecular species, the number of charges on each ion defining said ion's charge state number, said population of said multiply charged ions comprising a plurality of sub-populations, the ions of a distinct sub-population having the same charge number which differs from said charge number of an adjacent said sub-population by one, each of said sub-populations having said charge state number not less than five, said composition of matter formed by:

Cl Cont

dispersing a solution containing said polyatomic parent molecular species into a bath gas as charged droplets, said dispersing taking place in the presence of an electric field; and

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said polyatomic parent molecular species become dispersed in said bath gas as said multiply charged ions.

10 9

~~76~~. The composition of matter of claim ~~75~~ in which said charge state number of each of said sub-populations is not less than seven.

11 9

~~77~~. The composition of matter of claim ~~75~~ in which all molecules of said single polyatomic parent molecular species have substantially the same molecular weight.

12 9

~~78~~. The composition of matter of claim ~~75~~ in which said single polyatomic parent molecular species is selected from the class of compounds known as biopolymers.

13 9

~~79~~. The composition of matter of claim ~~75~~ such that when a mass spectrum is generated from said population of multiply charged ions, said mass spectrum comprises a sequence of peaks due to said plurality of sub-populations of said population of multiply charged ions and analyzation of said peaks of said mass spectrum determines a value of the molecular weight of said single polyatomic parent molecular species.

15 9

~~80~~. The composition of matter of claim ~~75~~ in which said single polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

14 13

~~81~~. The composition of matter of claim ~~79~~ in which said single polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

16

~~82~~. A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, the number of charges on each ion defining the ion's charge state number, each of said populations of ions comprising a plurality of sub-populations, ~~and for~~ each of said ~~populations, there being one of said~~ sub-populations ~~for each possible~~ having a charge state number whose minimum value is not less than three and whose maximum value is not less than five.

17 16

~~83~~. The composition of matter of claim ~~82~~ in which ~~said plurality of sub-populations for~~ each of said populations is comprised of one of said sub-populations ~~for each~~ having a charge state number whose minimum value is not less than five and whose maximum value is not less than seven.

18 16

~~84~~. The composition of matter of claim ~~82~~ in which ~~said plurality of sub-populations for~~ each of said populations is comprised of one of said sub-populations ~~for each~~ having a charge state number whose minimum value is not less than seven and whose maximum value is not less than ten.

19 16

~~85~~. The composition of matter of claim ~~82~~ in which all molecules of each of said distinct polyatomic parent molecular species have substantially the same molecular weight.

20 16

~~86~~. The composition of matter of claim ~~82~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

21 16

~~87~~. The composition of matter of claim ~~82~~ in which at least one of said ~~discrete~~ distinct polyatomic parent molecular species is selected from the group comprising proteins, peptides, polypeptides, carbohydrates, oligonucleotides and glycoproteins.

22 16

~~88~~. The composition of matter of claim ~~82~~ in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising synthetic polymers comprising less than four distinct elements, said group comprising polyethylene glycols.

23 16

~~89~~. The composition of matter of claim ~~82~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

24

~~90~~. A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, the number of charges on each ion defining the ion's charge state number, each of said populations of ions comprising a plurality of sub-populations, the ions of each of said sub-populations ~~sub-population within said plurality~~ having the same charge state number which differs from said charge state number of another of said sub-populations ~~within said plurality~~, each of said sub-populations having said charge state number not less than five.

25 24
~~91.~~ The composition of matter of claim ~~90~~ in which each of said sub-populations has said charge state number not less than seven.

26 24
~~92.~~ The composition of matter of claim ~~90~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

27 24 distinct
~~93.~~ The composition of matter of claim ~~90~~ in which at least one of said ~~discrete~~ polyatomic parent molecular species is selected from the group comprising proteins, peptides, polypeptides, carbohydrates, oligonucleotides and glycoproteins.

28 24
~~94.~~ The composition of matter of claim ~~90~~ in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising synthetic polymers comprising less than four distinct elements, said group comprising polyethylene glycols.

Cl Cont.

29 24
~~95.~~ The composition of matter of claim ~~90~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

30 24
~~96.~~ The composition of matter of claim ~~90~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 7000 amu.

31
~~97.~~ A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, the number of charges on each ion defining the ion's charge state number, each of said populations of ions comprising a plurality of sub-populations, ~~and for~~ each of said ~~populations, there being one of said~~ sub-populations having a ~~for each possible~~ charge state number whose minimum value is not less than three and

whose maximum value is not less than five, said composition of matter being formed by:

dispersing a solution containing said one or more distinct polyatomic parent molecular species into a bath gas as charged droplets, said dispersing taking place in the presence of an electric field; and

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said distinct polyatomic parent molecular species become dispersed in said bath gas as said multiply charged ions.

Cont.

32 D 98. The composition of matter of claim 97 in which ~~said plurality of sub-populations, for~~ each of said populations, is comprised of one of said sub-populations ~~for each~~ having a charge state number whose minimum value is not less than five and whose maximum value is not less than seven.

33 D 99. The composition of matter of claim 97 in which ~~said plurality of sub-populations, for~~ each of said populations, is comprised of one of said sub-populations ~~for each~~ having a charge state number whose minimum value is not less than seven and whose maximum value is not less than ten.

34 D 100. The composition of matter of claim 97 in which all molecules ~~of a given~~ of said distinct polyatomic parent molecular species have substantially the same molecular weight.

35 101. The composition of matter of claim 97 in which all molecules of at least one of said distinct polyatomic parent molecular species have the same chemical formula.

36 31
~~102~~. The composition of matter of claim ~~97~~ in which all molecules of each of said distinct polyatomic parent molecular species are chemically indistinct.

37 31
~~103~~. The composition of matter of claim ~~97~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

38 31
~~104~~. The composition of matter of claim ~~97~~ in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising synthetic polymers comprising less than four distinct elements, said group comprising polyethylene glycols.

39 31
~~105~~. The composition of matter of claim ~~97~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

C1 cont.

40 31
~~106~~. The composition of matter of claim ~~97~~ in which said bath gas is heated.

41 31
~~107~~. The composition of matter of claim ~~97~~ in which said dispersing of said charged droplets is substantially in a first direction and said bath gas is directed in a substantially counter current direction to said first direction.

42 31
~~108~~. The composition of matter of claim ~~97~~ in which said bath gas is at approximately atmospheric pressure.

43
~~109~~. A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, the number of charges on each ion defining the ion's charge state number, each of said populations of ions comprising a plurality of sub-populations, ~~and~~ ~~for~~ each of said ~~populations there being a one of said~~ sub-populations

having a
for each ~~of every possible~~ charge state number whose minimum value is not less than three and whose maximum value is not less than five, said composition of matter being useful for:

carrying out a mass analysis of the ions in said one or more populations and

~~from the results of said mass analysis~~ obtaining mass/charge (m/z) values for said ions of said sub-populations; and
from the results of said mass analysis

determining a value of the molecular weight of said distinct polyatomic parent molecular species from the mass/charge (m/z) values of said ions in said sub-populations.

44 43
~~110~~. The composition of matter of claim ~~109~~ in which ~~said plurality of sub-populations for~~ each of said populations is comprised of one of said sub-populations having a
~~for each~~ charge state number whose minimum value is not less than five and whose maximum value is not less than seven.

45 43
~~111~~. The composition of matter of claim ~~109~~ in which ~~said plurality of sub-populations for~~ each of said populations is comprised of one of said sub-populations having a
~~for each~~ charge state number whose minimum value is not less than seven and whose maximum value is not less than ten.

46 43
~~112~~. The composition of matter of claim ~~109~~ in which all molecules ~~of a given~~ of said distinct polyatomic parent molecular species have substantially the same molecular weight.

47 43
~~113~~. The composition of matter of claim ~~109~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

48 43 distinct

D 114. The composition of matter of claim 109 in which at least one of said discrete polyatomic parent molecular species is selected from the group comprising proteins, peptides, polypeptides, carbohydrates, oligonucleotides and glycoproteins.

49 43

115. The composition of matter of claim 109 in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising synthetic polymers comprising less than four distinct elements, said group comprising polyethylene glycols.

50 43

116. The composition of matter of claim 109 in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

C1 cont. 51

117. A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, the number of charges on each ion defining the ion's charge state number, each of said populations comprising a plurality of sub-populations, the ions of a distinct sub-population within said plurality having the same charge number which differs from said charge number of another of said sub-populations within said plurality, each of said sub-populations having said charge state number not less than five; said composition of matter being useful for:

carrying out a mass analysis of the ions in said one or more populations and

from the results of said mass analysis obtaining mass/charge (m/z) values for said ions of said sub-populations; and

from the results of said mass analysis

determining a value of the molecular weight of said distinct polyatomic parent molecular species from the mass/charge (m/z) values of said ions in said sub-populations.

52 51
~~118~~. The composition of matter of claim ~~117~~ in which each of said sub-populations has said charge state number not less than seven.

53 51
~~119~~. The composition of matter of claim ~~117~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

54 51 distinct
~~120~~. The composition of matter of claim ~~117~~ in which at least one of said ~~discrete~~ polyatomic parent molecular species is selected from the group comprising proteins, peptides, polypeptides, carbohydrates, oligonucleotides and glycoproteins.

55 51
~~121~~. The composition of matter of claim ~~117~~ in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising polyethylene glycols.

56 51
~~122~~. The composition of matter of claim ~~117~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

57
~~123~~. A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, the number of charges on each ion defining the ion's charge state number, each of said populations comprising a plurality of sub-populations, ~~and for~~ each of said ~~populations, there being one of said~~ sub-populations having a ~~for each possible~~ charge state number whose minimum value is not less than three and whose maximum value is not less than five, said composition of matter being formed and ~~mass~~-analyzed by:

dispersing a solution containing said polyatomic parent molecular species into a bath gas as charged droplets, said dispersing taking place in the presence of an electric field;

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said distinct polyatomic parent molecular species becomes dispersed in said bath gas as said multiply charged ions;

passing ~~a portion of~~ said multiply charged ions in said bath gas into a vacuum containing a mass analyzer, carrying out a mass analysis of the ions in said one or more populations and ~~from the results of said mass analysis~~ obtaining mass/charge (m/z) values for said ions of said sub-populations from the results of said mass analysis; and

determining a value of the molecular weight of said distinct polyatomic parent molecular species from the mass/charge (m/z) values of said ions in said sub-populations.

58 51
~~124~~. The composition of matter of claim ~~123~~ in which ~~said plurality of sub-populations, for~~ each of said populations, is comprised of one of said sub-populations ~~for each~~ having a charge state number whose minimum value is not less than five and whose maximum value is not less than seven.

59 51
~~125~~. The composition of matter of claim ~~123~~ in which ~~said plurality of sub-populations, for~~ each of said populations, is comprised of one of said sub-populations ~~for each~~ having a charge state number whose minimum value is not less than seven and whose maximum value is not less than ten.

60 57
D ~~126.~~ The composition of matter of claim ~~123~~ in which all molecules ~~of a given~~ of said distinct polyatomic parent molecular species have substantially the same molecular weight.

61 57
~~127.~~ The composition of matter of claim ~~123~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

62 57
~~128.~~ The composition of matter of claim ~~123~~ in which at least one of said distinct polyatomic parent molecular species is selected from the group comprising proteins, peptides, polypeptides, carbohydrates, oligonucleotides and glycoproteins.

63 57
~~129.~~ The composition of matter of claim ~~123~~ in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising synthetic polymers comprising less than four distinct elements, said group comprising polyethylene glycols.

C1 cont'

64 57
~~130.~~ The composition of matter of claim ~~123~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

65 57
~~131.~~ The composition of matter of claim ~~123~~ in which said bath gas is heated.

66 57
~~132.~~ The composition of matter of claim ~~123~~ in which said dispersing of said charged droplets is substantially in a first direction and said bath gas is directed in a substantially counter current direction to said first direction.

67 57
~~133.~~ The composition of matter of claim ~~123~~ in which said bath gas is at approximately atmospheric pressure.

68

~~134~~. A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, said polyatomic parent molecular species not comprising polyethylene glycol, the number of charges on each ion defining the ion's charge state number, each of said populations of ions comprising a plurality of sub-populations, ~~and for~~ each of said ~~populations, there being one of said~~ sub-populations having a ~~for each possible~~ charge state number whose minimum value is not less than three and whose maximum value is not less than five, the formation and mass analysis of said composition of matter being performed by:

dispersing a solution containing said polyatomic parent species into a bath gas as charged droplets, said dispersing taking place in the presence of an electric field;

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said polyatomic parent molecular species become dispersed in said bath gas as said multiply charged ions;

passing ~~a portion of~~ said multiply charged ions in said bath gas into a vacuum containing a mass analyzer, carrying out a mass analysis of the ions in said one or more populations and ~~from the results of said mass analysis~~ obtaining mass/charge (m/z) values for said ions of said sub-populations from the results of said mass analysis; and

determining a value of the molecular weight of said distinct polyatomic parent molecular species from the mass/charge (m/z) values of said ions in said sub-populations.

69

~~135~~. The composition of matter of claim 68 ~~134~~ in which ~~said plurality of sub-populations, for~~ each of said populations is comprised of one of said sub-populations

having a
for ~~every~~ charge state number whose minimum value is not less than five and whose maximum value is not less than seven.

70 68
~~136~~. The composition of matter of claim ~~134~~ in which ~~said plurality of sub-populations, for~~ each of said populations, is comprised of one of said sub-populations having a
~~for each~~ charge state number whose minimum value is not less than seven and whose maximum value is not less than ten.

71 68
~~137~~. The composition of matter of claim ~~134~~ in which all molecules ~~of a given~~ of said distinct polyatomic parent molecular species have substantially the same molecular weight.

72 68
~~138~~. The composition of matter of claim ~~134~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

Cl cont

73 68
~~139~~. The composition of matter of claim ~~134~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

74
~~140~~. A composition of matter derived from a sample comprising one or more distinct polyatomic parent molecular species, all molecules of each of said distinct polyatomic parent molecular species having substantially the same molecular weight, said composition of matter comprising a population of multiply charged ions derived from ~~for each of~~ said distinct polyatomic parent molecular species ~~of multiply charged ions~~, the generation of a mass spectrum from each of said distinct polyatomic parent molecular species of said composition of matter being characterized by a sequence of not less than two peaks ~~for each distinct population~~, each peak corresponding to a ~~discrete~~ sub-population of multiply charged ions, each of said sub-populations of multiply charged ions having a ~~discrete integral~~ number of charges not less than five wherein said number of charges of the multiply charged ions of each peak in said sequence of ~~for~~ each distinct

polyatomic parent molecular species differs from those of an adjacent peak by one charge unit.

75 74
~~141~~. The composition of matter of claim ~~140~~ in which at least one of said sub-populations has said number of charges not less than seven.

76 74
~~142~~. The composition of matter of claim ~~140~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

77 74
~~143~~. The composition of matter of claim ~~140~~ in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising polyethylene glycols.

78 74
~~144~~. The composition of matter of claim ~~140~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 5000 amu.

Cl cont.

79 74
~~145~~. The composition of matter of claim ~~140~~ in which at least one of said distinct polyatomic parent molecular species has a molecular weight not less than about 7000 amu.

80
~~146~~. A composition of matter comprising one or more distinct populations of multiply charged ions, each of said multiply charged ions in said distinct populations of multiply charged ions being ~~characterizable~~ characterized by the symbol xi, the numerical value of xi being the m/z value ~~for~~ of said one of said multiply charged ions such that $xi = M_r/i + m_a$ wherein M_r is the molecular weight of a distinct parent polyatomic molecular species from which all of said multiply charged ions in said distinct population of multiply charged ions are derived, i is an integer equal to the number of adduct charges attached to ~~(or removed from as in the case with negative ions)~~ said distinct

parent polyatomic molecular species to form said multiply charged ions, m_a is the average mass of said individual adduct charges attached to ~~(or removed from)~~ said multiply charged ions, each of said distinct ~~population~~ populations of ions comprising a plurality of sub-populations, the ions of each sub-population having the same values for i, m_a and M_r and therefore the same value of xi, said plurality of sub-populations comprising one sub-population ~~for each~~ having said integral value of said i whose minimum is not less than three and whose maximum is not less than five.

81 80

~~147~~. The composition of matter of claim ~~146~~ in which ~~there is~~ at least one of said plurality of sub-populations is comprised of one sub-population ~~for each~~ having said integral value of said i whose minimum is not less than five and whose maximum is not less than seven.

82 80

~~148~~. The composition of matter of claim ~~146~~ in which ~~there is~~ at least one of said plurality of sub-populations is comprised of one sub-population ~~for each~~ having said integral value of said i whose minimum is not less than seven and whose maximum is not less than ten.

83 80

~~149~~. The composition of matter of claim ~~146~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

84 80

~~150~~. The composition of matter of claim ~~146~~ in which at least one of said ~~discrete~~ distinct polyatomic parent molecular species is selected from the group comprising proteins, peptides, polypeptides, carbohydrates, oligonucleotides and glycoproteins.

85 80

~~151~~. The composition of matter of claim ~~146~~ in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising polyethylene glycols.

86 80

~~152~~. The composition of matter of claim ~~146~~ characterized by, when a mass spectrum is generated from at least one of said distinct populations of multiply charged ions,

said mass spectrum comprises a sequence of peaks of at least one of said plurality of sub-populations of said distinct population of multiply charged ions and, upon analyzing said peaks of said mass spectrum, ~~a determination can be made of~~ said peaks determine the value of said molecular weight, M_r, of said distinct polyatomic parent molecular species.

87
~~153~~. The composition of matter of claim ~~146~~ 80 in which at least one of said distinct polyatomic parent molecular species has a value for said molecular weight, M_r, not less than about 5000 amu.

88
~~154~~. The composition of matter of claim ~~146~~ 80 in which at least one of said distinct polyatomic parent molecular species has a value for said molecular weight, M_r, not less than about 7000 amu.

89
~~155~~. A composition of matter comprising one or more distinct populations of multiply charged ions, each of said multiply charged ions in said distinct populations of multiply charged ions being characterizable by the symbol xi, the numerical value of xi being the m/z value ~~for~~ of said one of said multiply charged ions such that $xi = M_r/i + m_a$ wherein M_r is the molecular weight of a distinct parent polyatomic molecular species from which all of said multiply charged ions in said distinct population of multiply charged ions are derived, i is an integer equal to the number of adduct charges attached to ~~(or removed from as in the case with negative ions)~~ said distinct parent polyatomic molecular species to form said multiply charged ions, m_a is the average mass of said individual adduct charges attached to ~~(or removed from)~~ said multiply charged ion, each of said distinct ~~population~~ populations of ions comprising a plurality of sub-populations, the ions of each sub-population having the same values for i, m_a and M_r and therefore the same value of xi, said plurality of sub-populations comprising distinct sub-populations with distinct values of i, each of said sub-populations having a value ~~for~~ of said i not less than five.

90 89

~~156~~. The composition of matter of claim ~~155~~ in which ~~each of~~ at least one of said plurality of sub-populations is comprised of distinct sub-populations with distinct values of i, each of said sub-populations having a value ~~for~~ of i not less than seven.

91 89

~~157~~. The composition of matter of claim ~~155~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

92 89

~~158~~. The composition of matter of claim ~~155~~ characterized in that when a mass spectrum is generated from at least one of said distinct populations of multiply charged ions, said mass spectrum comprises a sequence of peaks having at least one of said plurality of sub-populations of said distinct population of multiply charged ions and, when said mass spectrum is analyzed, said peaks determine a value of said molecular weight, M_r, of said distinct polyatomic parent molecular species.

93 89

~~159~~. The composition of matter of claim ~~155~~ in which at least one of said distinct polyatomic parent molecular species has a value of said molecular weight, M_r, not less than about 5000 amu.

94 89

~~160~~. The composition of matter of claim ~~155~~ in which at least one of said distinct polyatomic parent molecular species has a value of said molecular weight, M_r, not less than about 7000 amu.

95

~~161~~. A composition of matter comprising one or more distinct populations of multiply charged ions, each of said multiply charged ions in said distinct populations of multiply charged ions being characterized by the symbol xi, the numerical value of xi being the m/z value ~~for~~ of said one of said multiply charged ions such that $xi = M_r/i + m_a$ wherein M_r is the molecular weight of a distinct parent polyatomic molecular species from which all of said multiply charged ions in said distinct population of multiply charged ions are derived, i is an integer equal to the number of adduct

charges attached to ~~(or removed from as in the case with negative ions)~~ said distinct parent molecular species to form said multiply charged ions, m_a is the average mass of said individual adduct charges attached to ~~(or removed from)~~ said multiply charged ion, each of said distinct ~~population~~ populations of ions comprising a plurality of sub-populations, the ions of each sub-population having the same values for i, m_a and M_r and therefore the same value of xi, said plurality of sub-populations comprising at least one sub-population ~~for each~~ having said integral value of said i whose minimum is not less than three and whose maximum is not less than five, said composition of matter being formed by:

dispersing a solution containing said polyatomic parent molecular species into a bath gas as charged droplets, said dispersing taking place in the presence of a electric field; and

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said parent polyatomic molecular species become dispersed in said bath gas as said multiply charged ions.

cont.

96 95

~~162~~. The composition of matter of claim ~~161~~ in which ~~there is~~ at least one of said plurality of sub-populations is comprised of one sub-population having ~~for each~~ integral value of said i whose minimum is not less than five and whose maximum is not less than seven.

97 95

~~163~~. The composition of matter of claim ~~161~~ in which ~~there is~~ at least one of said plurality of sub-populations is comprised of one sub-population having said ~~for each~~ integral value of said i whose minimum is not less than seven and whose maximum is not less than ten.

98 95

~~164~~. The composition of matter of claim ~~161~~ in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

99 95

~~165~~. The composition of matter of claim ~~161~~ in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising polyethylene glycols.

100 95

~~166~~. The composition of matter of claim ~~161~~ in which at least one of said distinct polyatomic parent molecular species has a value ~~for~~ of said molecular weight, M_r, not less than about 5000 amu.

101

~~167~~. A composition of matter comprising one or more distinct populations of multiply charged ions, each of said multiply charged ions in said distinct populations of multiply charged ions being characterizable by the symbol xi, the numerical value of xi being the m/z value ~~for~~ of said one of said multiply charged ions such that $xi = M_r/i + m_a$ wherein M_r is the molecular weight of a distinct parent polyatomic molecular species from which all of said multiply charged ions in said distinct population of multiply charged ions are derived, i is an integer equal to the number of adduct charges attached to ~~(or removed from as in the case with negative ions)~~ said distinct parent polyatomic molecular species to form said multiply charged ions, m_a is the average mass of said individual adduct charges attached to ~~(or removed from)~~ said multiply charged ion, each of said distinct ~~population~~ populations of ions comprising a plurality of sub-populations, the ions of each sub-population having the same values for i, m_a and M_r and therefore the same value of xi, said plurality of sub-populations comprising at least one sub-population ~~for each~~ having said integral value of said i whose minimum is not less than three and whose maximum is not less than five, said composition of matter being characterized by the generation of a mass spectrum from at least one of said distinct populations of multiply charged ions comprising a sequence of peaks having at least one of said plurality of sub-populations of said distinct population of multiply charged ions and upon analyzing said peaks of said mass spectrum, ~~a determination can be made of~~ said peaks determine a value of said molecular weight, M_r, of said distinct polyatomic parent molecular species.

102 101

D 168. The composition of matter of claim 167 in which ~~there is~~ at least one of said

D plurality of sub-populations is comprised of one sub-population having said ~~for each~~ integral value of said i whose minimum is not less than five and whose maximum is not less than seven.

103 101

D 169. The composition of matter of claim 167 in which ~~there is~~ at least one of said

D plurality of sub-populations is comprised of one sub-population having said ~~for each~~ integral value of said i whose minimum is not less than seven and whose maximum is not less than ten.

104 101

170. The composition of matter of claim 167 in which said populations of multiply charged ions are formed by:

C1 (on't.

dispersing a solution containing said polyatomic parent molecular species into a bath gas as charged droplets, said dispersing taking place in the presence of an electric field; and

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said one or more distinct polyatomic parent molecular species become dispersed in said bath gas as said multiply charged ions.

105 101

171. The composition of matter of claim 167 in which at least one of said distinct polyatomic parent molecular species is selected from a class of compounds known as biopolymers.

106 101

172. The composition of matter of claim 167 in which at least one of said distinct polyatomic parent molecular species is not selected from the group comprising polyethylene glycols.

107 101

~~173~~. The composition of matter of claim ~~167~~ in which at least one of said distinct polyatomic parent molecular species has a value ~~for~~ of said molecular weight, M_r, not less than about 5000 amu.

108 101

~~174~~. The composition of matter of claim ~~167~~ in which at least one of said distinct polyatomic parent molecular species has a value ~~for~~ of said molecular weight, M_r, no less than about 7000 amu.

109

~~175~~. A composition of matter comprising one or more distinct populations of multiply charged ions, each of said multiply charged ions in said distinct populations of multiply charged ions being characterizable by the symbol xi, the numerical value of xi being the m/z value ~~for~~ of said one of said multiply charged ions such that $xi = M_r/i + m_a$ wherein M_r is the molecular weight of a distinct parent polyatomic molecular species from which all of said multiply charged ions in said distinct population of multiply charged ions are derived, i is an integer equal to the number of adduct charges attached to ~~(or removed from as in the case with negative ions)~~ said distinct polyatomic parent molecular species to form said multiply charged ions, m_a is the average mass of said individual adduct charges attached to ~~(or removed from)~~ said multiply charged ion, each of said distinct ~~population~~ populations of ions comprising a plurality of sub-populations, the ions of each sub-populations having the same values for i, m_a and M_r and therefore the same value of xi, said plurality of sub-populations comprising distinct sub-populations with distinct values of i, each of said sub-populations having a value ~~for~~ of said i not less than five, said composition of matter being characterized such that generation of a mass spectrum from at least one of said distinct populations of multiply charged ions comprises a sequence of peaks due to at least one of said plurality of sub-populations of said distinct population of multiply charged ions and upon analyzing ~~the same~~, said peaks of said mass spectrum allowed for the determination of a value of said molecular weight, M_r, of said distinct polyatomic parent molecular species, said composition of matter formed and ~~mass~~ analyzed by:

dispersing a solution containing said polyatomic parent species into a bath gas as charged droplets, said dispersing taking place in the presence of an electric field;

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said polyatomic parent molecular species become dispersed in said bath gas as said multiply charged ions;

passing ~~a portion of~~ said multiply charged ions in said bath gas into a vacuum containing a mass analyzer;

generation of said mass spectrum comprising a sequence of peaks due to said sub-populations of said one or more distinct populations; and

determination of the molecular weight of said one or more of said distinct polyatomic parent molecular species.

110 109 of said said

~~176~~. The composition of matter of claim ~~175~~ in which ~~each of~~ at least one plurality of sub-populations is comprised of distinct sub-populations with distinct values of i, each of said sub-populations having a value ~~for~~ of said i not less than seven.

111 109

~~177~~. The composition of matter of claim ~~175~~ in which at least one of said distinct polyatomic parent molecular species has a value ~~for~~ of said molecular weight, M_r, not less than about 5000 amu.

112 109

~~178~~. The composition of matter of claim ~~175~~ in which at least one of said distinct polyatomic parent molecular species has a value ~~for~~ of said molecular weight, M_r, not less than about 7000 amu.

113

~~179~~. A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, the molecular weight of said distinct polyatomic parent molecular species being at least about 5000 atomic mass units ~~(amu)~~, the number of charges on each ion defining the ion's charge state number, each of said populations of ions comprising a set of one or more sub-populations, the ions of a distinct sub-population within said set of sub-populations having the same charge state number which differs from said charge state number of another of said sub-populations within said set, each said sub-population having said charge state number not less than five, said composition of matter being characterized by:

carrying out a mass analysis of the ions in said one or more populations and ~~from the results of said mass analysis~~ obtaining mass/charge (m/z) values for said ions of said sub-populations; and

from the results of said mass analysis

determining a value of the molecular weight of said distinct polyatomic parent molecular species from the mass/charge (m/z) values of said ions in said sub-populations.

Cont

114

113

~~180~~. The composition of matter of claim ~~179~~ in which ~~each of~~ at least one of said plurality of sub-populations is comprised of distinct sub-populations with distinct values of said i, each of said sub-population having a value ~~for~~ of said i not less than seven.

115

113

distinct

~~181~~. The composition of matter of claim ~~179~~ in which all molecules of said ~~single~~ polyatomic parent molecular species have substantially the same molecular weight.

116

113

distinct

~~182~~. The composition of matter of claim ~~179~~ in which said ~~single~~ polyatomic parent molecular species is selected from the class of compounds known as biopolymers.

~~183~~. The composition of matter of claim ~~179~~ in which all molecules of at least one of said distinct polyatomic parent molecular species have the same chemical formula.

~~184~~. A composition of matter comprising one or more distinct populations of multiply charged ions generated from a sample comprising one or more distinct polyatomic parent molecular species, the molecular weight of said distinct polyatomic parent molecular species being at least about 5000 atomic mass units ~~(amu)~~, the number of charges on each ion defining the ion's charge state number, each of said populations of ions comprising one or more sub-populations, ~~and for~~ each of said ~~populations, there being one of said~~ sub-populations having a ~~for each possible~~ charge state number whose minimum value is not less than three and whose maximum value is not less than five, formation and mass analysis of said composition of matter being characterized by:

dispersing a solution containing said one or more distinct polyatomic parent molecular species into a bath gas as charged droplets, said dispersing taking place in the presence of an electric field;

allowing the solvent of said solution to evaporate from said charged droplets until at least some molecules of said distinct polyatomic parent molecular species become dispersed in said bath gas as said multiply charged ions;

passing ~~a portion of~~ said multiply charged ions in said bath gas into a vacuum containing a mass analyzer;

generation of a mass spectrum comprising a sequence of peaks due to said sub-populations of said one or more distinct populations; and

the determination of the molecular weight of said one or more of said distinct polyatomic parent molecular species resulting in a value for the molecular weight.

119 118

D 185. The composition of matter of claim 184 in which ~~said plurality of sub-populations,~~

D ~~for~~ each of said populations, is ~~comprised~~ comprised of one of said sub-populations ~~for each of every~~ having said charge state number whose minimum value is not less than five and whose maximum value is not less than seven.

120 118

D 186. The composition of matter of claim 184 in which ~~said plurality of sub-populations,~~

D ~~for~~ each of said populations, is comprised of one of said sub-populations ~~for each of~~ having said charge state number whose minimum value is not less than seven and whose maximum value is not less than ten.

121 118

D 187. The composition of the matter of claim 184 in which all molecules ~~of a given~~ of said distinct polyatomic parent molecular species have substantially the same molecular weight.